Notebook Series -- Notebooks by Edison
Notebook, N-22-00-00.1

The notebook contains dated entries from July-September 1917. It has been used in both directions. At one end is a series of undated speculations by Edison in regard to ether, light and optics, astronomy, electricity, electromagnetism, gravitation energy, and other topics. Among the numerous theorists he mentions are Augustin Louis Cauchy, James Challis, Rudolf Clausius, Albert Einstein, John Herschel, Lord Kelvin, Pierre Simon Laplace, and Georges Louis Le Sage. Several pages preceding the Edison entries have been removed from the book. At the other end of the book are notes by two unidentified experimenters pertaining to Edison's work for the U.S. Navy during World War I. These entries relate to "Splash Parallax" experiments at Red Bank, New Jersey, and include range and distance measurements for sighting of objects on Sandy Hook as viewed from the Atlantic Highlands and objects at Columbia University as viewed from the Palisades. The front cover is marked "Aether." The pages are unnumbered. Approximately 90 pages have been used.

7341
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19 PLATT ST.
NEW YORK.

Benjamin Lisbourt.

to get dispersion Cauchy say the matter in a prism must be considerably granular because there could be no prismatic colors of light was a wave motion & the glass of the prism was Continuous or granular structure with infinitely small grains says it must be distinctly granular whether it be discontinuous or not & its granulations not greatly less than in diameter than $\frac{1}{10.000}$ of the wave length of the shortest wave of light or about $\frac{1}{500.000.000}$ of an inch – Kelvin says 200 to 600 Molecules in one wave length

Limit of Drop $\frac{1}{200\,000\,000}$ of a Millimeter attained experimentally

Kelvin says if a drop of water was magnified to size of the Earth the Molecules would each occupy space greater than those filled by small shot & less than that filled by Cricket balls – such is that statement gives me Courage to proceed in this Gravitation Energy & Gravitation work

At 72° Fahr + ordpressure mean free path of Hydrogen which has the longest Trajectory seems to be $\frac{1}{20,000}$ mm — or a tenth part of length of a light wave $\frac{1}{10,000}$ mm (Crooks)

Dia of a Molecule is not the same for all Elements but average is about $\frac{8}{10.000\ 000}$ mm

Smallest Visible Organic particle is $\frac{1}{4000}$ mm Dia + will contain 30 000 000 atoms arranged in about 40 000 Molecules

Number of Molecules in Cubic CM. at ord temp + pressure is 19. 18 ought to Maxwell — 1 = 21 ought to (Crooks) not more than 6 - 21 ought to Kelvin —

Daniels to 225 days Earth is passing thru at present Vapors of Benzol Ethyl hydride + other alcoholic derivatives — Our atmos at outer limits is losing N + O. slowly + possibly gaining what we lost by free path movement

No attraction between Molecules (Boyle's Law) but by Compression a point is reached at high pressure when it doesn't follow the law, when near condensation to a liquid all do this Except H.
They are more easily Compressed at this point

Dalton's law is departed from by a mix of gases condensable with difficulty. Such a mix is found to be Even less condensible than the Component gases & the Critical temp is lowered

Charles law not obeyed throughout the whole range of Experimental pressures & temp
at a high pressure any increment of heat produces a disproportionally large increment of pressure

Order of Ductility Au Ag Pt Fe Cu Pd Al Zn Sn Pb

In gases the pressure diminishes about $\frac{1}{273}$ for each Centigrade degree of cooling the temp of 0° Cent being the standing point + Volume being maintained constant If cooled down to 273°C it wouldnt have any Kinetic Energy + no heat.

Spec heat of H is 16 times the Spec heat of O_1 to bring both to same temp

Spec H div by Atomic wt 6.4 all but phos + S is 5.86 to 6.93 & Carbon Silicon + Boron 3.3 but at higher temps it rises to 5.5 –

A substance not allowed to Expand + is heated no internal or External work is done + all the heat goes to raise its temp –

Sun is 600 times more massive than all the planets —

See Bodes Law

Major planets all move around the Sun in the same direction W to East

Orbits are but little inclined to each other

All minor planets have same Common direction but orbits have greater eccentricity & mutual inclination.

General rule is they move around in same direction of moderate inclination. Exception occurs with satellites of Uranus, which are nearly perpendicular to plane of orbit!

Satellite of Neptune & one Satellite of Saturn, are exceptions direction of Motion being Retrograde.

the greater the distance of a planet from the Sun the less is the speed with which it moves in its orbit.
Orbit being larger, the time of its Revolution is greater in a yet larger degree.

Linear speed approximately is inversely proportional to square root of the mean distance

Keplers Law – Squares of the times of Revolution are proportional to the Cubes of the mean distances

Under "planet" in Ency Brit is a table of characteristics of planets

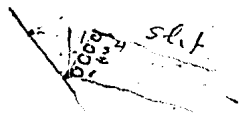
UP are perfectly spherical + perfectly Elastic, there is only 1 rate of vibration for all single UP, (natural rate) aggregates are many and having "

A low energy impact all give one light, if impacts are harder the rate dont change but amplitude increases
Even the light which can just be seen has the full spectrum, but only a little

is visible as the UP receives a harder blow & amplitude increases & we see more of the spectrum but the part 1st visible increases in brightness as well & so on until we reach beyond the Ultra Violet but nothing has changed Except the brightness due to increased amplitude

The reason Red or yellow appears first is a secondary & local phenomena due to the eye

The seperation into Colors is due to the UP impacts acting on Matter mechanically shaped to cause vibrations to be act up in one side of a UP agregate before another impact reaches the other part



Light as light does not go into the brain, it only causes an icitement because we can see pictures brightly illuminated ~~[illegible]~~ long after the light has ceased

The effect of light Excites a phosphorescence within the brain on some substance appearing at the seat of sensation within the brain as a moving picture.

All interplanetary and other space has all Energy ~~in Cum~~ Conveyed by UP particles moving at an average Vel of say 186 000 miles sec

These striking matter like the Earth are conveyed from the Earth not by motion of the UP particle but by vibration + Exchange from UP groups to adjacent groups until on the opposite side of the Earth the vibration is communicated to a free single UP + it proceeds into space at a lower speed but in time by Collisions is brought up to the average speed of 186 000 M per second some UP may be 260 000 miles per second + some 1/2 or less in speed still slower in the interstices of groups

The LLP groups of various sizes are free + the space between each group is filled with rapid moving single LLP particles which can convey the vibration from group to group by bodily movement as in space,

Evidently the speed of vibration must be when it reaches to opposite side of the earth very much slower + heat is absorbed to the extent of the loss of speed

Passing thru the moon the loss is small + the moon must be rather cool internally

With the earth more heat is absorbed,

But with the sun the loss must be great + account for the sun's high temp it being constantly supplied from the LLP. from space

Note if 2 platinum balls 1 cofg 1 inch dia & 1 of 2 inch dia put into a furnace the small one would become Red 1st. after both were red (1000° Fah—)
The large ball would still be red after the 1st was dark—.

The energy of impact given to the Matter of the sun & converted into Vibration & the subsequent throwing out of a UP into space necessitates from the great thickness of the sun that it would have a very low Comparative Velocity towards the Earth while the particles from the Earth much higher the particles striking the Earth on opposite side or dark part have full speed— Hence the tendency of the Earth to move in a straight line by centrifugal action is exactly balanced by pushing it towards the sun especially as the particles from the sun are very much slower—

The scrimming action of the planets as compared to the sun is small— hence only the whole effect is not larger but together with the Moon

will account for the tides
+ also account for gravitation

If the Earth was isolated in
space + perfectly spherical
and homogeneous + rigid + going at press
A Cubic Crystal 1 inch square
would already weigh the same
If now the sun appeared
Immediately screening would appear and the bombardment
would continue till the
Earth would be forced to
go into a circle around
the sun — Now the Cube
inch would weigh more
at 12 midnight than at
12 noon — because the
UP coming from space are faster
than from the space between
the sun + the Earth

A single UP going toward the sun ~~exhp~~ acting on a Iron group of UPs has the natural amplitude of the UP Vib raised & on it reaching the Earth & Colliding with Stray & proximi increases the visibility of a definite position in the Spectrum & makes a line

Not 1 but thousands of UP having impressed on them the 7½ amplitude, The many 7½ lines is due to the ~~increasing~~ number of UPs received increasing amplitude & till more lines are Visible

It should be recalled that in the weakest Spectrum all the lines are there ~~in fact~~

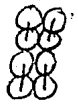
It looks as if the first compound UP formed was 2 + then increases by 2 which grow in Complexity.

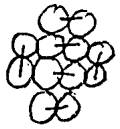
These 4 have 2 points of attraction & cannot hold a 5th as it will only have 1 point of attraction. if all these by gravity have rotations right will hold together against average speed of UP bombardment

The next would be 2

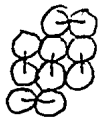
4

6

 8

 12

10 — doubtful

 → or 10

Thus the first UP Complex may be the "Electron" but I think it is more like 12. Hydrogen being very Complex

The velocity of matter in Vacuo by great Condensation of power from a small surface could drive a UP Complex at great Vel, but even if too of Vel of light the energy might be conveyed by Transfer of the Vibration in the Complex to single free UP + then travel at Vel of Light. Bring a single particle of Lampblack in a flame up to incandescence + it sends out waves travelling with Vel of light.

Note. If all Elements are made of UP spheres, cubes + other shapes it may be that their different properties are due to their or the Vibrating times of each Complex when Struck or rather bombarded by the UP single —

The Vibrating time of the Lead Complex owing to Mass could not be the same as Oxygen hence Carbon would burn the rate of Vel P60 + give out heat simple

to decompose P_6O, energy would have to be received to decompose it to ether free the groups, or make a new combination

Perhaps the vibration instead of increase or diminution of rate might be in amplitude or area subjected to UP bombardment.

A single UP may have a general Vel of 186000 sec The 1st UP Complex would go slower because it was formed from three UP which in the general mass of universe made up of single UP. This is [T] 2 UP. When this was caught by a planet + slapped to vibration or speed would be 1/2 or 1/4 that of a single UP angled up in matter + so on

If bullet has high speed it goes thru 1/4" steel & makes no light or smoke, If speed is lower it fails to pierce, gives light & lead goes off in smoke
with Spinthriscope of Crooks if vel great it penetrates. The volumes of lead slow it is stopped & gives light & rebounds

X ray retarded in proportion of atomic weight, as its a high rate Light Vibration its only Ultra light
Hence the heavy atomic wt has more UPs or larger complex as to thickness, hence in arranging UPs to represent the number of wt & their dispositions as to groups the above should be kept in mind as to shape the X ray has to penetrate, Evidently should not be sheets, But if they are leafs then in the metal say they are in all positions & penetration would average up no matter what shape or doubtful

Work this out - Think should be worked out on basis of Cubic Crystals which may be imitation of reality —

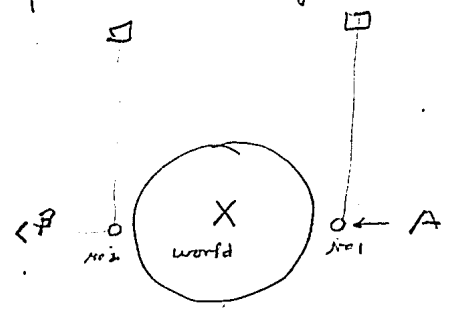


Fig 1

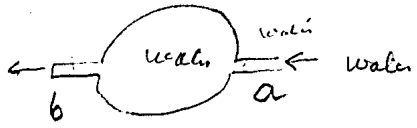


Fig 2

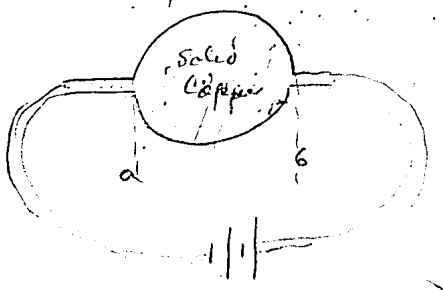
If fig one X is billiard ball + perfectly elastic + No 1 + 2 very small balls perfectly elastic, If No 1 hit at 4000 ft sec No 2 would fly off 8000 ft sec - The interposition of X would amount to nothing except distance of travel

So UP of space Count backward the world is made up of UP Complexes without loss of ~~spe~~ total speed, just perfect

Elastic the Vel would fall + the Ball that struck at 4000 ft sec No 1 —— would as represented by No 2 would Rebound as a slower speed, say 3875 ft sec

Fig 2 shows hollow Ball with water paper the velocity of water entering a + emerging at b is very little different yet the Vel of water in hollow globe is very slow -

Fig 3



Electric current - if a wire stretched from a to b2 the current would have a certain total Resistance, if now the wire between a + b were cut out + a large ball of Copper inserted the Section a b would have Enormously less Resistance but speed of the Electron

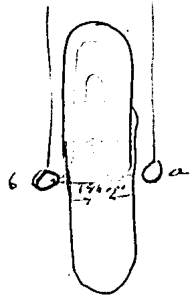
Stress would be the same

very small Billiard balls

A

If a strikes at 186000 Miles second, & ball is 186000 Miles dia, the speed will be the same only a very little of the wave will reach a in 1/186000 or 1 sec gradually increasing to full + tapering off - like propagation of any Electric waves. If dia of glass is doubled - then the time will be 2 seconds & speed be the same + long the same but if the matter is in a form like

B



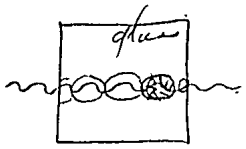
The speed will still the same + some + some part of the wave will arrive at b in the ~~[illegible]~~ head of the second but it will be very weak + the tail will not cease for say 3 seconds

Thus in perfectly Elastic bodies - a stress of any kind acts like Electricity -

If you have a solid glass ball - & send a beam of light through it from a to b, it is said that the beam is reduced to half the speed of light - I do not believe this, I do not think that any experiment warrants this that is absolutely above suspicion whatever experiments warrant it is based on theories that are not yet proved altho they apparently are OK -

I think that the UP. from say the Sun have impressed on them various waves ~~by~~ received from other UP. & the impressed waves ~~[illegible]~~ of compression in the Mass of the UP while moving from Sun to earth, many by collisions impart them to others but the great Majority get them from

sun to earth without Collision
& impact these waves to the UP
Complexes, as their energy & amplitude
are small the soon fall below measurement
when passing thru 30 to 50 ft of
glass But the great waves due
to the Natural period of the UP
itself ~~[illegible]~~ Millions of Times
greater proceed thru the whole
Earth without great loss,
The light waves are impressed extraordinarily
weak & enormously Complicated, Whereas
the UP of space all have a natural
period as part of the UP complex
of Matter,
That these impressed waves are
Complicated is shown by the great
number of them impressed on the UP s
to give 3000 lines in the Spectroscope



If a UP having on it certain impressed waves, not the gigantic waves of its natural period, these waves will not spread out because a wave or stress is so small that when it starts to spread its almost immediately stopped laterally & the whole train arrives in a straight line at the opposite face of the glass there is very little broadening of the line. The D line shows this,—

The great natural period waves on the UP spreads very considerable,

This wave gives us heat.

The impact of a UP increase. is slower but ~~the~~ in amplitude enormously & passes thru Everything & is not confined to an aperature of the slit—

its only the fine impressed over tone waves that are controlled by the slit & localized so we can see the phenomena of the spectrum—

Its the impact wave that produces gravitation pressure, The enormously rapid overtone waves impressed on the UP

that gives the light pressure waves
& it is this unbalancing of the
Equal pressure on the Earth by
screening of the Sun to Cause
the Earth to be pushed towards
the Sun not attracted & its the
Centrifugal Inertia that counteracts
this pushing towards the sun
to the equilibrium point of 92 million
miles at present Vel of the Earth
in its orbit

My point is that a mass of
perfectly Elastic Matter would
have a natural period which
period or rate would be constant
that carrying these waves in
absolute matter free space they
would continue forever
That if this matter was going
at a certain Vel should impact
so as to change its direction
it could transfer these vibrations
Suppose the rate was a million
a second with 1 amplitude its
natural rate, it could have other

waves impressed on it 100 million a second & transfer these waves to another particle

The question now arises is this could a single sphere of matter perfectly Elastic have any period of its own, - I think it could if the wave was ½ its dia or something thing like this ~~[illegible]~~ like a resonator, Any other rates that multiples exact would be impressed as there would be no loss from friction in the matter of the sphere & as the latter was suspended in space free from all matter action at a distance impossible, hence no radiation all these vibrations of the sphere would keep up unimpaired in amplitude forever

It is even possible that the speed of these waves might be ~~[illegible]~~ thru this kind of

Matter might be even greater than the speed of the sphere itself from absolute space,
~~We know that~~ Light travels 186 ~~000~~ Miles in a second + is carried by ~~the~~ ether spheres moving at that rate but suppose a wire 186 000 miles long made of the same perfectly elastic matter is used What would be the speed of a wave, as a guess I should say very much faster, inertia does not enter.

We must take into consideration in the corpuscular theory that only of the particle moving but oscillations of its mass from waves too & fro

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We observe a certain phenomenon by the Eye We call it Light, also by another instrument we observe a phenomenon & we call it radiant heat, by another instrument we call it Electricity. by another instrument we call it gravitation but it all travels at the same rate or velocity, + all are the same

thing. but in this transfer of Energy it encounters Matter of Various Kinds hence we get Various phenomenon. + we measure these phenomenon with Various instruments ~~so~~ ~~out~~ sensitive to convey the phenomenon to our senses –

In all Cases the instruments used are accumulative. The Eyes must be impressed for a certain time before the phenomenon of light is observed, if the light, like an invisible star is ~~[illegible]~~ too weak, we accumulate it indirectly on a photograph plate; the Eye requires $\frac{1}{40}$ of a sec to accumulate

If heat we accumulate by a bolometer or Thermometer both accumulative – if Electricity we accumulate by storing in iron or masses of Matter both accumulative –

Hence we are all observing the effects or interaction of energy on Matter, leave out the Energy itself we dont investigate this —

All the energy in the universe ~~is the~~ originally came from the primal & ultimate spherical of matter moving at a Vel higher than 200,000 Miles a second & all matter in masses is the gradual formation of Complexes of these primal spherical to form matter of less speed & the increase of the Complexes to form masses & these into larger Masses & so on till we have suns & planets & that complexes are constantly being formed ~~the~~ at this moment, Lithia Complexes ~~and~~ all kinds of matter are well & they are ~~the~~ moving in space & aggregating with iron Zinc & other Complexes to form Matter so called.

That the Energy stored up in these ultimate spheriouls moving at these high speed through a Space unlimited in Extent is amply sufficient to supply Our Sun + all other suns forth the energy now returned to space ~~[illegible]~~ but without impairment for Countless Centuries + without perceptably lowering the speed of these spheriouls 1 ft in a Century of <u>at all</u>

All the power we get for running our Locomotives, Ships, Etc is got from the Energy stored up in the ether of space. We simply accumulate it by slow + roundabout methods + then let it return to its original state many rapidly than it was accumulated

All our elements are due to formation of aggregates of UP, They form Complex's

These complex are not spherical They are square but different shapes. When 12 to 14 are formed from the simplest Complex (2 UP) they aggregate by 2's. ~~Each is different~~ They start a new group still more Complex but the 1st one of the second group has a shape like the first one of the group known to us Hydrogen & so on for another group Repeating shapes Every group.

When complex's of the same kind come together they form Crystals, & these are never spherical,

As to Electricity if we
rub a mass of primal Complexes
they are not set in Vibration
But if we rub Molecular
Compounds made up of 2 or
More primal Complexes —
They the Molecular Complex
are thrown into vibration
in other words they clear up
the Energy due to rubbing
The Body is charged by
rubbing long & hard the
amplitude of these vibrations
not being transferable to other
matter increases if any
kind of matter is used in charging
The the amplitude is diminished
the new matter receives vibration
of lower amplitude if the
2nd body has infinitely large
mass it reduces the vibration
to practical zero & the
small body loses its vibration
entirely — If only the
2 bodies are used & both vibrating
at same amplitude they the 1st

body has no more effect on 2nd body as they both have same Rate of Vibration same amplitude.
We call this phenomenon Electricity, but it is only the same vibration, impressed on larger masses & when allowed to proceed & impart the vibrations to Ether matter it travels at speed of light.

Energy concentrated in matter in form of Vibration has a limit when it can free itself ~~& will don't~~ by imparting the Vibration to adjacent matter it will do so explosively & proceed to lose all its its Energy or Vibration. If Conditions are such that there is a lag as in a Leyden jar so after discharging it can recharge itself then it will oscillate & produce alternating waves

Compounds are chargeable or
Can be set in Vibration No Element
Can — phosphorous Sulphur
Selenium in one form conduct
The other forms a compound —
due to Condensation with probably
the simplest Complex of UO
but so small as to be unweighable
when decomposed — O Se 4 P
Cannot probably be set in
Vibration by rubbing —

With a Leyden jar of 6 balls
gives a spark. It sends a
~~the a~~ wave of train of Vibs
to the air of space in
one direction ~~that~~ same
time with a lag it obtains
the glass of the jar in an
opposite direction of the
first charge This permits
the charge in the air to
Reverse its direction by
discharging back — notes

The second wave starts in while it passes around the ~~same~~ circuit in reverse direction it nevertheless charges the air in the same direction as 1st charge

So that the spark is found to be reversal of direction several times yet the wave going to space is always in the same direction.

The apparent reversals were never given out by the jar but are due to discharge back to the jar on reversal of direction of the jar circuit.

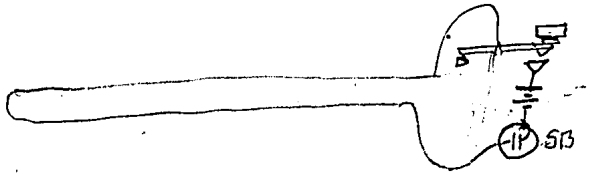
These waves I do not believe goes into the Ether of space so called neither do they go into & travel on the Earth. Non Conducting Matter like the glass is necessary for propagating the wave it goes in up & up complexes

Its speed is probably 186 000 Miles sec minus loss of speed by Conducting Closed circuits, — on account of the comparative slow oscillation in the jar & closed circuit on discharging — The 1st discharge wave can go out several thousand miles & reverse its direction & discharge at the jar while its being recharged for the reason that the speed of propogation is so great.

A Leyden jar is an automatic Reversing switch
a chge flows in one direction while charging & when disch goes in the opposite direction. But there is No P or N Elec
No more than a clock wound up is P & run down is negative —

Induction between 2 loops
one of which has a battery
acts the same way as the
matter between coils, The wires are
dischargers & chargers — or poles —
in Vac its the UP possibly - or
residual gas or UP Complex
finer than H or so called Electrons

A storage battery will give a
AC on a line



account for Expansion & Contraction
of Metals, Crystalline or otherwise.

↓ UP Complex pressed together
by UP bombardment - not in contact
but UP particles having no speed
at Absolute Zero but oscillate between
+ seperate the Complexes more & more
as temp rises by increasing the Vel of the simple UP.

Laplace when he found that the force of Gravitation if propagated by an Elastic medium must have a Velocity Exceeding 100 Million times that of Light Concluded that astronomers might continue to consider the action as instantaneous
Hence the Res of the Ether is Nil

Fourier says temp of Space is 50 @ 60 c below Zero C° Pouillet −142 C or 174 Fahr above Absolute Zero but Pouillet's data was erroneous

Its Calculated that the 50 000 000 stars give to the Earth $\frac{1}{1000}$ of the heat given by our Sun
Then assuming all stars were near the 1st Fixed Star a Centuri

Wood says Ether of space cannot be at Absolute Zero as then it would have no Elasticity & be incapable of transmitting Waves

Vel of Light 3/4 of Vel in a Vacuum
This Cant Explain aberration of light on Undulatory Theory but its ~~worked~~ by Emission Theory

Stoney says there is not less than 10^19 10.000 000 000 000 000 000 Molecules in a Cubic Millimeter of gas at ordinary temp & pressure

Then Ether particle is 10^40 of a pound
10.000 000 000 000 000 000 000 000 000 000 000 000 000 000

Wood says if air was heated to millions of deg Fahr it would not like the Ether & transmit light waves — All say light waves unlike sound propagate Transversely
Says Space heat of the Ether is at least many Million times that of any gas

Dr Valson
"Wonder" Phil Mag Nov 1885

Concludes
That the Ether has a density that in
Volume Equal to 20 Volumes of
the Earth weighs one pound
Its pressure on one square mile
is one pound
Its Specific heat is such that it
would require as much heat
to raise the temperature of one pound
of it one degree Fahr as it would
raise 2.300|000 000 Tons of
water the same amount
which is required to be able
to transmit a wave of
Light or heat 186300 miles per
second & transmit 133 ft lbs of
heat Energy from the Sun to the
Earth in each second per square
ft of surface Exposed
& it must be everywhere practically
non resisting & sensibly uniform
in temp, density & Elasticity

Gee & they swallow this

Le Sage theory
1st Direction of stream of particles
producing gravity is such that
an Equal number of particles
are moving in all directions

2nd That the streams are all
Equally dense or the total
~~ass~~ assemblage of matter
forming the streams is of the
same density in all parts

3rd That the mean Velocity
of the streams is everywhere
the same

LeSage says not more than 1 out
of 100 of the particles Ever come in
Collision in several thousand
years

John Preston says that Gravity & the
effects can be accounted for on
LeSage principle if the path of
the particles is great, (free path)

Clausius Mathematically figures that in a gas. The mean path of a particle. ie average distance which a particle moves before striking another increases in proportion to the square of the diameter of the particle diminishes By making the particles small enough its mean free path could be increased to any extent

Challis says. The assumption that all the bodies of the Universe are gravitating towards Each other is inconsistent with stability all that we requires to admit that the effects of gravity hold them as great a distance as we have determined them —

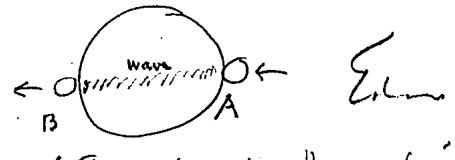
LeSage said the UP came from the depths of space & diverge from therein —

LeSage says matter is porous & the particles went clear thru the planets

3 other men had theories similar to LeSage —

LeSage pointed out that in order to Explain gravity the particles must rebound from the molecules of Matter at a less Velocity than they strike —

J Preston no supply of Energy to the particles are required or any supply or waste of matter



UP strikes at A & rebounds. This relieves the Earth. Sets up waves which travel thru the Earth. The action of waves on B is to use B as an inertia fulcrum to push the Earth forward. hence no retardation against a moving Earth

Herschel say according to Undulatory Theory of light – the amount of force which may be exerted on each point of space is 1.145.000 000 000 times the Elastic force of ordinary air at Earth's surface –
So that the pressure of Ether upon Each square inch of surface must be 17 000 000 000 000 of pounds
The observed phenomena of heat & light forces us to accept

Note 2 Masses of Resin rubbed on glass Repel one another –
2 Mass of glass which have been rubbed with Resin repel one another – (ie 2 masses in somewhat Condition generally repel one another)

A piece of glass after being rubbed with Resin is said to bear a charge of ~~Resin~~ Vitreous Electricity
The Resin on the other hand is charged with Resinous Elec The Vitreous is P & Resinous N

When body is chgd w. Elec there is always an equal charge of opposite kind of Elec somewhere – Every destruction of E has an equal amount of Elec of opposite kind

If a body is chgd & hung up in middle of room the walls have opposite kind of E

All follow Square of distance Law –

Body on dry glass support in a Vacuum holds it charge for a very long time also in cold dry air

Spec Inductive Cap. of a Vacuum differs little from air
All gases have the same inductive capacity whatever their temp or density
If their pressure is raised their spec Inductive Cap is raised proportionately
Conversely - when a gas is employed as a dielectric chg the plates diminishes at pressure

A Condenser leaves a residual acts as if not perfectly Elastic
Glass recovers slowly
shocking + jarring acts in same way besides discharg
Quartz has 1/9th the residual capacity of glass
Iceland Spar seems to have no residual capacity.
discharges almost wholly & instantly
Liquids instantly lose charge

Have Assisted Collect Extremes

Most Expansible + least Expansible Metals
Highest + Lowest Atomic weight of Element
Most oxidizable + least oxidizable -
Most Coherent + least Coherent -
Best + Worst Conductors heat, Electricity, + (Metals)
+ Extremes of Many other Elements

The UP complexes which form Matter, are suspended in space the same as planets, possibly so at absolute Zero - Even then they are in Vibration within + from Complex to Complex

Complexes of 2 UP 4 8 + possibly 12 pass thru glass probably + no Vacuum is possible with such Complex. until they arrive at Combinations greater than say 12 UP then they are too large to pass thru glass the so called Electron has possibly 18 UPm it

Glass rod gives say N Elec when rubbed = rod sealing Wax Opp Elec say P when rubbed Either rod attracts a feather ~~so~~ suspended by a fibre

Glass rod rubbed by silk handkerchief held in hand will attract the feather but if silk is not sufficiently after rubbing doesn't attract the feather its supposed rod rails neutralizes each other

~~Rubber when a rod is electrified by friction~~ Why

If one Electrified body touches one not Electrified the 1st body loses E + the other gains if spheres + both same radii be equal in Electrifcn —

Use a rod Electrified let it touch the feather in short time feather will fly away as it gets chgd with same kind of E + these repel

If a rod of sealing Wax is Electrified at 1 End, it keeps it for considerable time while the other End remains unelectrified

If an insulated rod of metal is used both Ends Electrified, if connected to Earth, loses it

Gold leaf Electroscope, chgd rod brought near (not touching) leaves fly out if rod withdrawn immediately collapses — Called Electrification by induction —

~~If any non conductor~~ If metallic screen interposed bet electrified rod + the Electroscope — the screen being connected to Earth, the Electroscope is not affected

If a hollow closed Conducting body be chgd, however highly with Elec the whole of the Charge is found on the outside surface & none whatever inside.

On a wire circuit, if by Expenditure of work the difference in potential is kept up the flow may continue indefinitely But if no work is expended all parts of the Conductor instantly reach the same potential.

Residual chg in Leyden jar which takes time to decrease after discharg is hastened by Tapping.

This is like Magnets.

Jars jar can be chg P & dischgd then chg N + so on several times & then the residual charges will come out PNPNPN as on dis of shorted up

This is line of Mechanical Lifting in various amounts of a glass fibre - its alters up all these dif classes & if Leyden jar it will go thru these regions

Specific Inductive Capacity

glass generally	7.8	Cavendish
Shellac	4.9	
Rosin & Beeswax	3.0	
Shellac	2.0	Faraday
Sulphur	2.24	
glass more than	1.76	
Ebonite	3.15	Unknown
Paraffin	2.32	
Sulphur	3.84	
Resin	2.55	

Selenium 24 hours after Cooling	10.2	
Later	59.0	
Another Experiment 24 hours after C	8.4	
Later	116.0	S
Quartz	4.6	
Fluorspar	6.5 to 7.2	

Gordon

Glass	3.1
Ebonite	2.3
Gutta Percha	2.4
Rubber soft	2.4
Paraffin	1.99
Shellac	2.74
Sulphur	2.58
Carbon Bisulphide	1.81

Large masses of matter like the Earth for instance Each UP Complex has its Component spheres or Cubes in contact but these complexes are suspended in Space at present temperature of the Earth, Each complex is suspended in space, & free UPs bombard it ~~to~~ the spaces between the Complexes varies with the temperature, at absolute Zero there is some space probably & not absolute Contact,

Isotropes is probably a mass of say Iron UP Complexes at high temp or bombardment which are seperated in many multiples, The highest temp would seperate all into the fundamental Iron UP Complex, lower temp into double UP Iron Complex & so on at Low temp there might be thousands, Each would have a vibrating time when struck by a single UP different according to mass & Each UP would rebound from it & having impressed upon it the Vibrating time of that particular ~~so~~ Isotrope, proceed thru the depths of space & deliver it to 1st piece of Mass Matter it Collided with & Countless Millions would Carry Every note the total number of Iron Lines in the Spectrum is accounted for

I do not see why ~~an~~ UPs should not carry waves motion thru space altho proceeding on their journey seperately If a billiard ball be hit by another both suspended in space there would be a wave of compression forced on the balls in collision & these waves would continue for ever,

Probably the Elasticity must not be infinitely perfect but closely it,

Einstein displacement of light is nothing more than screening by sun & the spherical distribution light from a star is twisted toward the sun by collisions W. those proceeding outwardly from the sun having less velocity than towards the sun hence light UP are pushed towards the sun

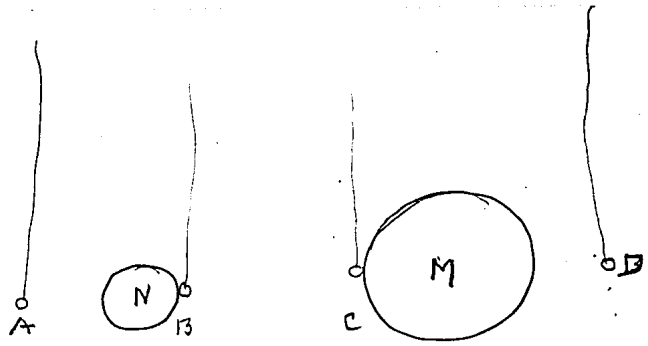
Sound travels say 1000 ft a second, this is slow because the wave is between gross matter & Barometric pressure a disturbance of barometric pressure & partly Elastic It proceeds thru water 4000 ft because the elasticity of attraction is quicker than Barometric pressure while in steel it is 15000 ~~miles~~ ft a second because the Elasticity of Cohesion is very much more perfect, But ~~wa~~ that which gives light UP upon which is impressed the wave may travel at any speed thru space as it passes thru space void of matter or anything to retard it but when the UP strikes matter its ~~pas~~ waves is imparted to the UP of the Complex & therefore on the wave at a speed dependent on the Elasticity of the UP. which is probably sufficient to give a speed of 100 000 miles per second or less. If the UP traversing space have a mean Vel of 186 000 miles per second

when proceeding from the sun
have probably 190 to 200 000
miles per sec when proceeding
from unoccupied space
But when the strike the Earth
they transmit the waves of vibration
impressed on the particles to
adjacent UP's of the Complex then
light to free UP between the Complex
to next Complex & clear then
the Earth, these waves throw off
or transfer their Energy to the UP
from space which bombard
& thus in rebounding from the
Earth receives additional impulse
over & above that due to
Collision Elastically waves

Necessarily there must be a
slight loss & a lowering of
speed in this transfer from
the Earth The loss represents
the pressure we call
Gravitation & also heat.
If there was no large body

near like the sun Moon & planets
there would be no screening - the
speeds would be the same
(transfer of motion) & the heat
would also be the same & the
world would travel in a straight
line If the world increased in
size there would be more energy
lost in the mass & it would get
hotter & if as large as the sun
it would be just as hot,
~~if~~ if speed were the same

In other words planet etc passing
thru space have a temp compared
to their mass of UP complexes -
& this temp is due to a loss of
Energy due to imperfect transfer
of by impact, like the imperfect
transfer thru a row of steel
balls



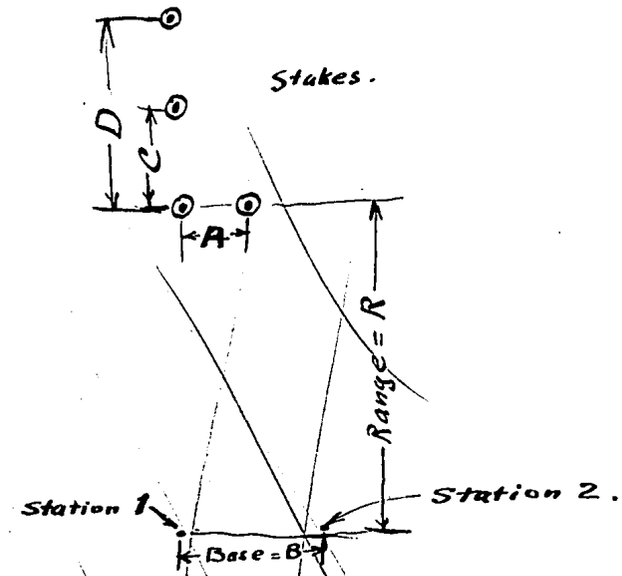
If D hits M C will hit N with a certain pressure

If A hits N B will hit M. but in this case the hit of B will produce a stronger pressure on M than C upon N because the law by transfer then M will be greater hence N will be pushed towards M more than M will push N

Expenses.

July 16, 1917.

	RR Fare [illegible] to Lake Placid	.88
	RR Fare [illegible] to Lake Placid & return	1.75
	Telephone [illegible] to Grandmount	.35
July 31	To K. Stocker R.R. Fare & supper	1.00
Aug. 4	Trip in own auto, Atlantic Highlands & return, 100 miles	7.00
	Paid Sept. 12	
Sept. 12.	R.R. Fare U.Y. to U. London 124 miles @ $2\frac{1}{4}$	2.79
	Pullman chair 75 and supper 1.25	2.00
Sept. 12-13	Hotel Bill (Room ~~& breakfast~~)	2.00
Sept. 14	Camera and ground-glass	1.35
14	Extra Ground Glass & cutting	40
15	Artist's materials	55
	" "	60
16.	R.R. fare Greenport to U.Y.	2.88
	Pullman	.50



Base Line B (Laid Off) =
Distance A (Laid Off) =
Angle A at 1 =
Range (Calculated) =
Distance C (Laid Off) =
" D " " =
Angle C at 1 =
" C " 2 =
" D " 1 =
" D " 2 =

Distance C (Calculated) =
" D (") =

Stakes: (Range to far stake is 165 ft. deviation to far mast)

$$x = \frac{(7035)^2 \times 37 \times .00001243}{160.5 + 7035 \times 37 \times .00001243}$$

$$\doteq \frac{22800}{168.5} = 142 \text{ ft.}$$

$$y = r\theta = 7035 \times 183 \times .00001243$$

$$= 16 \text{ ft.}$$

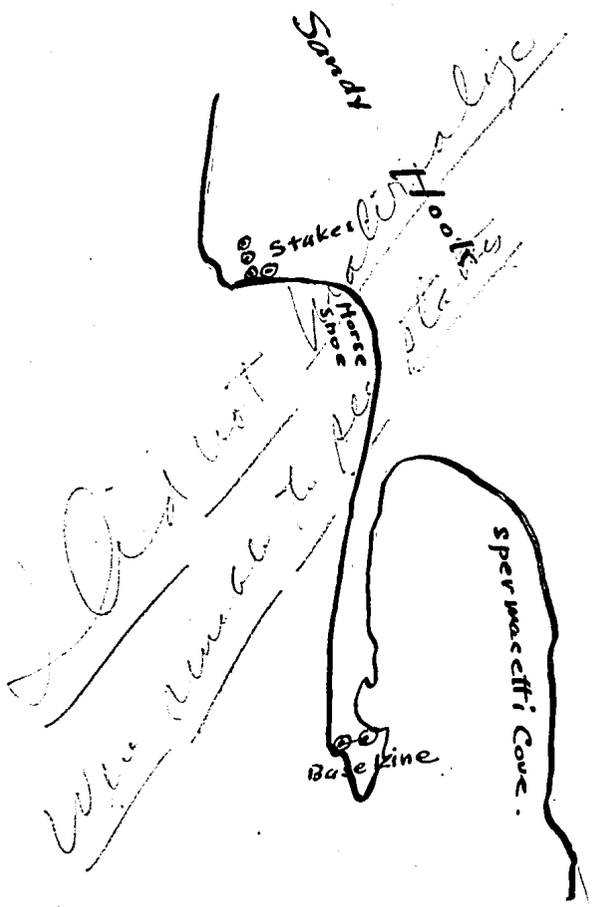
$$\text{Dist.} = \sqrt{(142)^2 + (16)^2} = \underline{143} \text{ ft.}$$

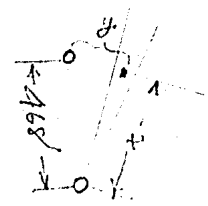
Then check well with 168 + 141.5 Map. But if mast height is taken as 65 ft., this makes the range 7800 ft., and the distances appear:

Bet. masts: — 527 ft.

Bet. Stakes: — 164 ft.

"Splash Parallax" Experiment July 28th, 1917.





160.5

Range Measurement from Station A
Horizontal Angle of Middle Window
Next to Top Floor - [illegible]
horn.

.0011
.0013
.0014

Actual vert. hor. meas = [illegible]
" " " plates = 141.5

If max. height to be measured
is to be 60 ft. & range 7200 ft.
the distance [illegible]

$$x = \frac{(7200)^2(120) \times .00001243}{160.5 + 7200 \times 120 \times .00001243}$$

$$= 449$$

$$y = r\theta = 7200 \times 120 \times .00001243 = 74 \text{ ft}$$

$$\text{Dist.} = \sqrt{449^2 + (74)^2} = \underline{\underline{455}} \text{ ft.}$$

Station B.

Angle of Masts - Inches

.0880

.0876

[illegible]

[illegible]

.0880

Average difference from Sta. A = $\frac{170}{10000}$

Angle of Stacks -

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Average diff. from Sta. A = $\frac{37}{10000}$

Range Measurement from Station A to far (Schmerhorn) Mast.

Angle of Mast-Height

	Inches
	[illegible]
Height of mast.	.0670
bet. 60 and 65 ft.	.0671
This makes range between	~~.0679~~
7200 and 7800 ft.	.0674
	[illegible]

SPLASH PARALLAX
EXPERIMENT.
July 31, 1917.

SIGHTING ON ANTENNA
MASTS + ON SMOKE-STACS
of COLUMBIA UNIVERSITY
FROM PALISADES.

STATION A.

ANGLE OF MASTS - Inches

·0758
·0758
·0759
·0761

Angle of Stacks

·0163
·0166
[illegible]
[illegible]
[illegible]

Distance Bet. Stations = 160·3 Ft.
160·4

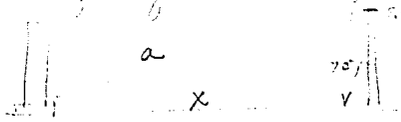
Distance between Objects III + IV as determined approximately from maps = 3050 feet
This is accurate to about 50 feet

Distance as determined by Splash parallax method = 2945 feet

Hence error is about 105 feet ± 50 feet

Measurement of actual distance at Sandy Hook between Objects I + II, and between III + IV. Sept. 11, 1917.

Objects I + II
Heliometer readings sighting from base of stake to 75 ft. up the mast:
.1686, .1687, .1686, .1688
Average = .1687
Sight of stake sighting upon = 4.02 ft



Oblique distance $a = \frac{4.02}{.1687 \times .1243} = 382$ ft.
Horizontal distance x
$= \sqrt{382^2 - 75^2} = 382 - \frac{1}{2}\frac{5625}{382} = 375$ ft

Distance as determined by Splash parallax method = 344 feet

Error = 31 Feet

~~From this may be made~~

Distance Calculations. Obj. III + IV

○ Obj III
Range Tower
Proving Ground

• Obj IV
[illegible]

b = 336 feet

345 ft.

$\gamma - \delta = .0166 + .0044 = .0210$ inches

$= .0210 \times 0.1243$ rad. $= .00261$ radian

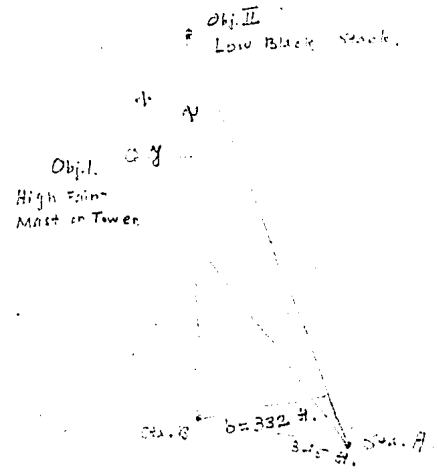
$$x = \frac{18060 \times 18060 \times .00261}{336 - 18060 \times .00261}$$

$$= \frac{851000}{336 - 47} = \frac{851000}{289}$$

$$\boxed{\begin{array}{l} x = 2945 \text{ Feet} \\ \text{Distance bet. Objects III + IV} \end{array}}$$

Probably correct to 100 feet.

Distance Calculations. Obj. I + II.



$\gamma - \delta = .0151 - .0138 = .0023$ miles

$= .0023 \times .1243$ rad. $= .000286$ radian

$$x = \frac{R^2(\gamma-\delta)}{b - R(\gamma-\delta)} = \frac{20100 \times 20100 \times .000286}{332 - 20100 \times .000286}$$

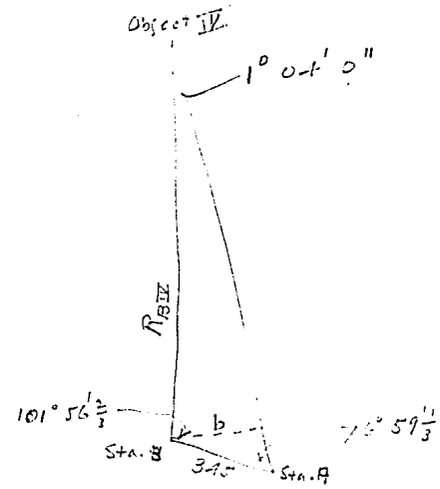
$$= \frac{115520}{332 + 5.5} = \frac{115520}{337.5} = 342 \text{ ft.}$$

$y = .0138 \times 20100 \times .1243 = 35$ ft.

$z = \underline{\underline{344}}$ feet = Distance bet. Objects I and II

Probably correct + 20 ft

Range Calculations. Obj. III + IV



1° 04' = 0.01861 radian = sin 1° 4'

sin 76° 59 1/3 = .9744

Effective Base Line = b = 345 × .9744 = 336 Ft.

Range $R_{B\,IV} = \frac{336}{.01861} = 18{,}060$ Feet.

= 6,020 Yards

= 3.42 Miles.

Range Measurements.

Angle Bet. Station A & Object II at Sta. B.

Repetition	Ver. A	Ver. B
	180	0
I.	75°29'	104° 31'
II	29° 3'	150° 57'
III	133° 35'	46° 25'
IIII.	121° 53'	58° 7'

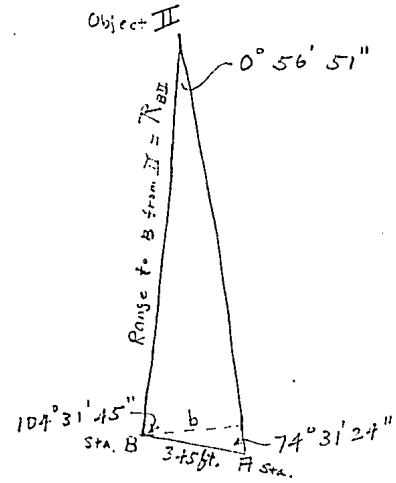
$\boxed{\text{Average} = 104°31'45'' = 104°31'.75}$

Angle Bet. Station A & Obj. IV at Sta. B.

Rep.	Ver. A	Ver. B.
	180	0
I.	78° 3'	101° 57'
II	23 53	156 7
III.	125 50	54 10
IV		

$\boxed{\text{Average} = 101°56'40'' = 101°56'.67}$

Range Calculations. Objects I & II



$$\frac{R_{BII}}{\sin 74°31'24''} = \frac{345}{\sin 0°56'51''}$$

$$\sin 74°31'24'' = \sin 74°31'.4 = .96374$$

$$\sin 0°56'51'' = \sin 0.9475°$$
$$= \sin .01653 \text{ rad.} = .01653$$

$$\text{Range } R_{BII} = 345 \times \frac{.9637}{.01653} = \underline{20{,}100} \text{ feet}$$
$$= \underline{6700} \text{ yards}$$
$$= \underline{3.81} \text{ miles}$$

Effective Base Line = b = 345 × .96374 = 332.3 Feet.

Range Measurements.

Angle Bet. Sta. B and Obj. II from Sta. A.

Ver. B	0	–	74° 31' 30"
Ver. A	180	–	105° 28' 30"
Repetition II			
Ver. B			
Ver. A			33° 8'
Rep. III			
Ver. B	0		
Ver. A	180		

Repetion I:	Ver. A	Ver. B.
	105° 29'	74° 31' 0"
Rep. II	30° 57	149 03
Rep. III	43° 36'	136° 24'
Rep. IV	118° 6	61° 54'
Rep. V	167° 23'	12° 37'

Average = 74° 31' 24" = 74° 31'.4

Angle Bet Sta B and Obj IV from Sta. A.

	Ver A.	Ver. B.
I	103° 1'	76° 59'
II	26° 2'	153° 58'
III	50° 55'	129° 2'
IV		
V		

Average = 76° 59' 20" = 76°.57.33

Heliometer Measurements.

Station B.

Angle bet. Objects I + II, Aver. = .0138

Inches .01375 .0136 .0139 .0140 .0138 .0137 .014

Black Stack to the left in Heliometer

Angle bet. Objects III + IV Aver = .0166

Inches .0165 .0167 .0166 .0167 .0167.

Black Stack to left.

Station A

Angle Bet. Objects I + II Aver. = .0161

Inches .0159 .0160 [illegible] .0163 .0161

Black stack to [illegible] in Hel[illegible]

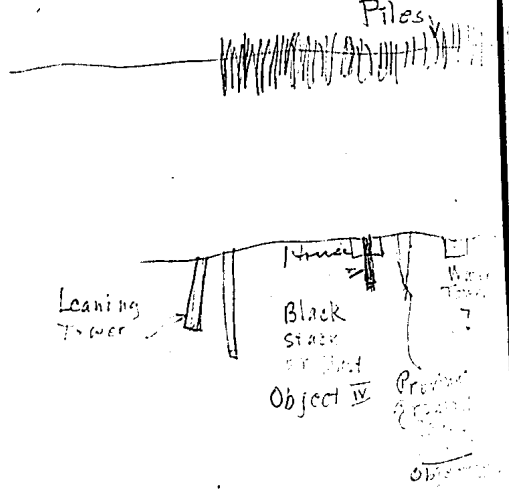
Angle between objects [illegible] Aver. = .0044

Inches .0043 .0044 [illegible]

Black stack to right

Note added Sept. 11th, 1917

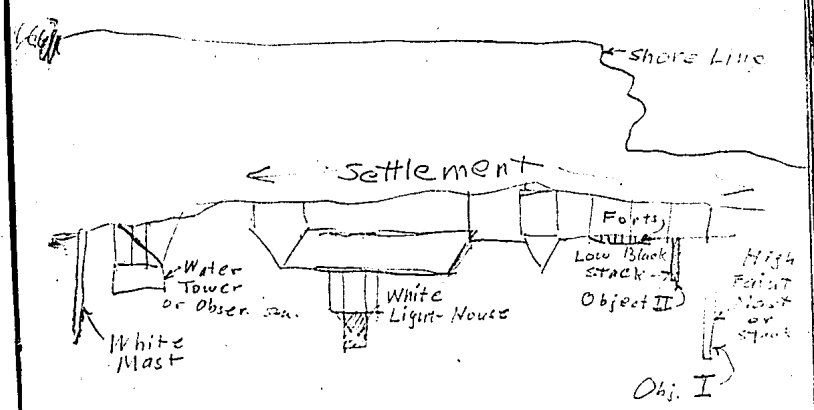
Object No. I identified as western wireless mast.
Object No. II as Smoke-stack of Central Power Plant
Object III [illegible] Ground Range-Tower
Object IV Pneumatic Stable
Aids by Lieut. Joseph Cage
Artillery Engineer



Splash Parallax Experiment
Aug. 4th, 1917.
Weather - Rather Hazy.
Sighting from Atlantic Highlands on Objects on Sandy Hook.

Length of Base-Line = 345 Feet.

Objects as seen through Heliometer at Station B.



16 53	179 [illegible]	[illegible]
2	108 [illegible]	136 [illegible]
160 58	149 [illegible]	
	30 57	
	4 [illegible]	
	[illegible] 38	

179 60	108 63
102 [illegible]	74 [illegible]
26 [illegible]	10 [illegible]
[illegible]	
77	